

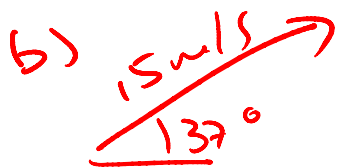
Example #2: In the Olympics, the Hammer Throw competition involves athletes spinning a heavy weight on a cord around several times before releasing the weight at an angle to the ground in order for it to travel a maximum distance. If one such weight of mass 15 kg was spun 4.5 times in 3.2 s in a circle of radius 1.7 m, then released at an angle of 37° to the ground,

- what was the average speed and acceleration of the weight as it was spun?
- how far was it flung, assuming it landed at about the same height it was released?

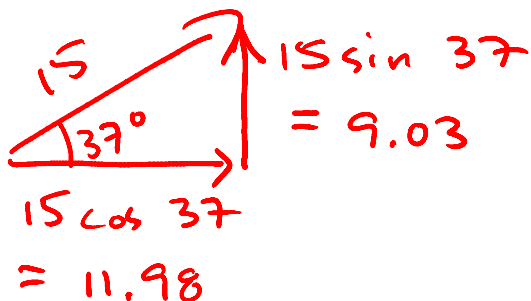
$$a) \quad T = \frac{3.2}{4.5} = 0.711 \text{ s}$$

$$v = \frac{2\pi r}{T} = \frac{2\pi(1.7)}{0.711} \quad \boxed{v = 15 \text{ m/s}}$$

$$a = \frac{v^2}{r} = \frac{15^2}{1.7} \quad \boxed{a_c = 1.3 \times 10^2 \text{ m/s}^2}$$



\Rightarrow use kinematics to solve



vert:

$$v = v_0 + at$$

$$-9.03 = 9.03 + -9.8t$$

$$t = 1.84 \text{ s (up + down)}$$

hor:

$$d = v_w t = 11.98(1.84) \quad \boxed{d = 22 \text{ m}}$$